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The Impact of NTMs on Trade: Evidence from Developing Countries

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Abstract

Non-tariff measures such as food safety and technical standards are used to achieve the non-trade objective of protecting consumers' health and safety. On the other hand, they can also be deployed as a trade secure tool to drive a price wedge between foreign and domestic producers. This study investigates the protectionist tools of 34 developing countries food safety standards using a sample of developing countries food imported from developed and other developing countries with a specific focus on vegetables, Trunks, machinery, and tobacco. We employ theoretical framework of gravity equation by applying SGMM estimation. Our results indicate that vegetable and machinery variables are negative and statistically significant. Meaning that both variables have a negative impact on GDP, in other words, both variables are not support GDP and economic growth in the developing countries. Finally, Trunk variable is positive and statistically significant. It shows that, this variable leads to promote economic growth in the developing countries. While Tobacco is positive and statistically insignificant, meaning that this product is not play an important role in the trade sector in our sample countries.

Keywords: Trade Protectionism, Non-tariff measure, Food Safety Standards, Developing countries. And SGMM

JEL classification: G17; G21

Introduction

Over the past few decades, reducing global tariffs has shifted the focus of trade policy research to better understand the impacts of non-tariff measures (NTM). It is described as policy measures other than tariffs which can have an economic impact on the global trade (UNCTAD, 2010). Measures for agricultural

production, sanitary and phytosanitary (SPS) and technical barriers to trade (TBT) are costly trade barriers (Cadot et al 2015, Skorobogatova and Knebel 2011)

While SPS and TBT measures are put in place to ensure that imports meet food safety, animal or plant health, and importing countries' technical regulations, these requirements may affect trade through the addition of increased compliance, inspection, and operating costs. Exporters have declared that some SPS / TBT measures have requirements that are disproportionate to actual levels of risk and hamper trade excessively, often acting as disguised trade barriers. On the other hand, it can be difficult to determine the impacts of types of measures. Unlike tariffs, NTMs are neither transparent nor easily measured, resulting in many challenges in terms of data, methodology and concept.

This study empirically investigates the impacts of SPS / TBT measures in the 34 developing countries around the world on imported agricultural and machinery trade. This analysis applies a more advanced GMM system estimation method that explores the impacts of specific SPS / TBT concerns on commodity trading raised importers from developing nations.

The rest of this paper is organized as follows: Section 2 argues the NTM in developing countries. Section 3 reviews the previous literature. Section 4 presents an overview of the methodology and data collection. Section 5 discusses the finding and results. Finally, Section 6 discusses the concluding remarks.

Non-Tariff Measure In the Developing Countries

In some developing countries, resource poor are in a double bind. On the one hand, they are involved in a race against time to create sufficient jobs to absorb huge compatriots of young people attempting to enter working age. Failure to deliver these jobs can mean renewed political turmoil, whether against a background of democracy or not. On the other hand, on world markets, many developing countries today do not have a clear competitive advantage. They do not have the educational/ R&D infrastructure to remain competitive in; high tech; industries; but in labor intensive industries they do not have the flexible and cheap labor force they need to compete. The primary source of competitive advantage of some developing countries is that they are located in some large and important markets such as Middle East countries. This may motivate them generate assembly activity in industry sectors where time based competition is important.

To take full advantage of this prospective competitive advantage, everything should be targeted towards productivity and reliability, from Infrastructure to legislative environments to private sector management, so that all elements of supplier quality are programmable for large buyers. In addition, infrastructure is insufficient, the business environment is overwhelmed by "legacy regulations" trade facilitation is not up to international standards, there is not even the beginning of a competitiveness oriented dialog between private and public sectors, and the management of the private sector is far from the lean.

All this can and should change, but attempts to reform have been far too timid to make a difference to date. Understanding why efficient advice is essential. Many economic and Political factors that contribute to the impasse, but regulations are a non-negligible part of the picture, including non-tariff measures (NTMs).

Econometric analysis performed for this note reveals that their arsenal of NTMs increases the internal price of impacted products considerably, ultimately making a contribution to poverty and social discontent. Furthermore, NTMs are a specific example of a broader syndrome of heavy and ill-targeted economic intervention, resulting in ineffective and sometimes even paralysis.

In this regard, they provide a gateway to a broader regulatory reform agenda, with a two- fold objective: (i) directly reducing trade costs, and (ii) contributing to the creation of a culture of competitiveness oriented dialog between public administrations and the private sector, in which issues such as those discussed above could be effectively addressed.

Literature Review

The literature on standards and global trade flows concentrated on the impact of minimum quality standards and standards of compatibility on trade flows (Grandal and Shy, 2001; Otsuki et al, 2001; Disdier et al, 2008; Ferro et al., 2015; Fontagne et al., 2015; etc).

Latest contributions have, however, investigated how standards could be used as an instrument of legislative protectionism. Although the literature on the protectionist use of safety standards is abundant, in contrast to the very limited empirical literature, some theoretical works are available. On the theoretical side, early research in this field has qualified protectionism to occur when the welfare that maximizes domestic country standards is higher than the social planner's, and vice versa for anti-protectionism. They demonstrated that domestic policy makers specify the number of standards to maximize productivity and consumer welfare in accordance with the welfare of certain interest groups.

These domestic standards are then compared to a worldwide appropriate international standard implemented by a social planner to maximize social welfare, including foreign profits (Fisher and Serra, 2000; Marette and Beghin, 2010). Furthermore, the major conclusion that emerges from these theoretical literature publications is that standards are being used as tools of disguised protectionism to protect domestic producers from competition. The main conclusion of these theoretical literatures is that standards are used as tools of disguised protectionism to preserve domestic industries from competition (Anderson et al., 2004; Fischer and Serra, 2000; Sturm, 2006; Sheldon, 2013).

Nevertheless, some other authors' extensive theoretical background has pointed out that standards are not necessarily protectionist and may sometimes be anti-protectionist (Maertens and Swinnen, 2007; Marette and Beghin, 2010; Swinnen and Vandemoortele, 2011; Tian, 2003). However, the empirical validation of these theoretical predictions are rare, a gap which this study attempts to fill. On the other hand, the empirical validation of these theoretical estimation, however it is rare, a gap that this study aims to fill out. The divergent nature of these theoretical assertions indicates the need for standards to be empirically analyzed product by product before ultimately categorizing them as protectionist tools an indication that empirical analyses are of paramount importance. The different nature of these theoretical statements shows that the need for product by product empirical study of standards before fundamentally categorizing them as a protective tolls as indicated that empirical analysis is of paramount important.

Methodology and Data Collection

In order to Many of the literature studies that examine the issue of bilateral and multilateral trade relations using gravity models to identify and assess the issues raised and test their different hypotheses. The main reason for using these models is that they are responsible for the political, spatial and temporary manufacturers in trade relations (see Head and Mayer, 2013). The basic form of the trade gravity model implies that the trade volume between any two trade partners is an increasing component of their national income and populations, and a reducing function of the distance between them. The theoretical basis of the gravity model is appropriate to almost every full-scale trade model, as shown by Evenett and Keller (2003). The theoretical framework for the model of our study is derived from the new theory of trade, which provides scale economics and an imperfect market. Moreover, Bergstrand (1990) gives a description of the link between the gravity equation and bilateral trade patterns within the framework of monopoly competition in the new theory of trade. Anderson (1979), Bergstrand (1990) and Helpman and Krugman (1985).

Based on product differentiation, they derive gravity equations from trade models and increase scale returns. The model is also extensively used. The model is also widely used by Shepherd and Wilson (2010), Czubala, Shepherd and Wilson (2009), Portugal-Perez, Reyes and Wilson (2009), and Shepherd (2007) Determining the impact on imports of non-tariff measures, therefore, this study uses mostly unexploited data from the different types of database. Specifically, the study tests the impact of Non-Tariff measures on trade in the 36 developing countries and for this study we estimate a system GMM model in cross section data. To test this correlation, gravity model is specified as follows:

$$\ln (Ex_{ijt}) = a_i \Phi [a_1 SPS_{ij(t-1)s} + a_2 TBT_{ij(t-1)s} + a_3 \ln (GDP_{it} \times \ln GDP_{jt})] + a_3 X_{ij} + a_4 MR_{ijts} + v_i + v_s + \varepsilon_{ijt} \dots \dots \dots (1)$$

And an outcome equation of the form:

$$\ln (Ex_{ijt}) = \beta_1 SPS_{ij(t-1)s} + \beta_2 \ln (GDPC_{it} \times \ln GDPC_{jt}) + \beta_3 TBT_{ij(t-1)s} + \beta_4 \ln (GDP_{it} \times \ln GDP_{jt}) + \beta_5 X_{ij} + a_4 MR_{ijts} + \beta_\lambda \lambda(\alpha) + v_i + v_s + \varepsilon_{ijts} \dots \dots \dots (2)$$

Where

ln – denotes natural logarithms.

Ln Ex_{ijt} – denotes the exports value of specific HS6 products of country I to country j at time t.

β₁ & a_i – It's Constants

Φ(.) – is a standard normal distribution function

SPS_{ij} (t-1) –explains the sanitary and Phytosanitary measure between the reporting country i and the maintaining country j at time t – 1 for a specific HS6 product line

(GDPC_{it} × GDPC_{jt}) –depicts the log of the product of Gross Domestic Product per Capita of country i and country j at time t.

(TBT)_{ij}(t-1) – reports a concern over a technical barriers to trade between the reporting country i and the maintaining country j at time t – 1 for a specific product line

v_i – it's a full arrays of importer

v_s – it's a full arrays of HS6 product

λ(α) –denotes the inverse mills ratio which is predicted from equation (1)

MR_{ijts} – contains multilateral resistance terms based on distance, as well as on the NTMs concern.

X_{ij} –contains the usual gravity controls, such as the log of distance, measured as the geographical distance between capitals

ε_{ijts} – It's Error terms

Furthermore, we follow Bergstrand (2009), who derive theory-consistent MR indexes from a Taylor series expansion of the Anderson and Van Wincoop (2003) gravity equation. We adapt their strategy to the panel data for our estimation. Hence, all regressions include multilateral resistance terms. To control for any country- specific characteristics, product specifics and time trends, we include full arrays of importer v_i, HS6 product v_s, and separately in the equation. Hence, we control for a wide array of observable and unobservable factors. The concentrate of this paper is on SPS and TBT concerns reported by importers to the developing countries.

For SPS measures, we consider different variables: (i) vegetables and tobacco concerns are notified at the 6-digit level of the HS classification, and (ii) a normalized frequency measure SPSFreq_{ij}(t-1)_s. The normalized SPS measure is defined as the number of concerns on HS6 products. For TBT we also concentrate on different variables for our estimation such as machinery and trunk products.

Table 1: Variable descriptions and sources

Variable	Description	Source
Ex	Export	World Development Indicators (WDI)
Dist	Distance between capital of each countries	the CEPII database (the Centre d'Etudes Prospectives et d'Informations Internationales in France database)2019
Mach	Machinery	UNCTAD-Trade Analysis Information System (TRAINS) 2019.
Veg	Vegetables	UNCTAD-Trade Analysis Information System (TRAINS) 2019.
Trun	Trunks	UNCTAD-Trade Analysis Information System (TRAINS) 2019.
Tob	Tobacco	UNCTAD-Trade Analysis Information System (TRAINS) 2019.
GDP	Gross domestic products per capita	World Development Indicators (WDI) 2019.

Findings

Table 2 presents the results of the estimations by using of System of generalized method of moments (SGMM). Moreover we observe that the models yield statistically significant results and testing that some coefficients are close to zero produces a p-value equals 0.01 for the F statistic.

The standard gravity model variables are significant in the two cases and had the expected signs. Additionally, the magnitudes of the coefficients of these variables are negative such as Machinery and GDP per capita. And it stringency has a negative impact on trade and is significant at 1% and the estimated parameter value is 0.00.

Also, the trunk variable identifying developing countries are positive but not significant in our estimation model, which analyzes the disaggregated stringency indices. This implies that developing countries on average have a lower intensity of trade with developed countries for trunk commodities.

Furthermore, regulations and standards have a negative effect, although when considering the dimensions of regulations or standards, not all standards have the same effect on trade. The results demonstrate that phytosanitary regulations have a negative effect on trade intensity, but the parameter tobacco is not significant, meaning that it has no impact on trade in the developing countries. Moreover, Li and Beghin (2013), in a meta-analysis of SPS impacts on trade, conclude that the use of a direct NTM variable in estimated trade models leads to larger effects on trade than the use of more aggregated indices. Likewise, Drogue´ and DeMaria (2012), however, find that similarities in NTM between countries may even increase trade. However, they also recognize that cross-country differences in these limits will restrict trade.

Table 2: One step difference GMM

Variables	Coefficient	Standard Error	T-Value	Interval
CONSTANT	13.54913	2.807923	4.83*** (0.000)	19.05256
Distance	.0875556	.283725	0.31 0.758	.6436465
Vegetables	-.0328683	.0250398	-1.31 0.189	.0162089
Machinery	-.0698912	.0289325	-2.42*** 0.016	-.0131846
Trunks	.0250312	.0317015	0.79 0.430	.087165
Tobacco	.003787	.0273204	0.14 0.890	.057336
GDP	-.3653701	.0953075	-3.83*** 0.000	-.1785707
Ln Sargant Test	517.4004 0.0000			
AR(1)	-5.7594 0.0000			
AR(2)	1.9004 0.0574			
N	544			
T	15			
Obs per Group	14			
N.Group	34			

Note: All variables are in log form except the dummy variables. The equations are estimated with the multilateral trade resistance variables. *, ** and *** denote significance levels at 10%, 5% and 1% respectively.

In addition, table 3 presents the results for the selected agricultural and industry commodities, i.e. Tobacco, vegetables; Machine and Trunk for the extensive margin of import estimations by using the second step of SGMM model which is the estimation for the same variables which are little bit different from the first step. The economic mass of the trading partners (exporters and importers' GDPs) propels the probability of exporting developed countries to the developing countries. There is an increased probability of exporting goods by new exporters and by those that have exported in the past but are no longer exporting (disappearing exporters) and would want to export in the future, as well as by those that are currently exporting with a probability of expanding their exports for every instance of economic growth witnessed. Economic growth in the exporting countries enhances the possibility of new firm entries into different types of goods. A 1% decreases in GDP raises the probability of new imports. Similarly, expenditure on developed countries export such as vegetables, measured by the GDPs of the importing countries, it shows that this commodity is a normal good such that an additional 1% increase in expenditure on this commodity will enhance the probability of exporting on it. Moreover, the developing countries standards on vegetables do not hinder the extensive margins of it, means that the standards are not restrictive in that they prevent imports of vegetables at the extensive level and this is statistically significant. This implies that many of the imports at this line of trade often considered the standard requirements for market access beforehand and ensured adequate compliance prior to entering the market. This result is in conformity with Maertens and Swinnen (2007), Mangelsdorf et al. (2012), Xiong and Beghin (2011), Lui and Yue (2011), Reyes (2011), Jaffe and Henson (2004), Henson and Humphrey (2008) and Henson and Jaffee (2008). Moreover, some importers assisted many of their exporters and potential exporters technologically in complying with the technical regulations, which is in line with the hypotheses and findings of Okello and Roy (2007). The trade costs by distance proxy do not inhibit exports of vegetables, machine at this level of trade, although they are statistically insignificant. However, GDP is a significant factor at the extensive margin of imports and it has a negative statues. In addition, others independent variable such as tobacco is positive and statistically insignificant.

In addition, GDP in the developing countries are impacted negatively and significantly on the extensive of vegetable imports. Given the fact that vegetables are a high-value commodity, many industrial countries often promote and encourage export of the commodity through improving investment-friendly domestic policies. Vegetables are an economically important normal good in the developing countries. There is a

virtually negligible marginal propensity to consume this commodity at additional levels of consumer income. This means that tastes and preferences in this market do not really encourage the propensity to import. Thus, the trade intensity effect of developing expenditure on vegetables is negative and indistinguishable from zero. This is similar to Ganslandt and Markusen's (2001) result, although they find a significant propensity to consume. The result also shows that developing countries SPS on vegetables have significant adverse effects on the extensive margin of imports. This could be due to the nature of the commodity, which is perishable. The fact that the commodity needs to be imported the same day that it is harvested and it will affect prospective exporters that do not have the science and technology to preserve the quality of the commodity. Similar findings are reported by Chen, et al. (2006), Chevassus-Lozza, et al. (2008). Trade does not hinder the flow of this trade and they are economically and statistically insignificant. In a study on the international trade in fruits and vegetables, Emlinger et al. (2008) obtained smaller values for distance of between 0.58 and 0.84, where the higher value corresponds to the group of more perishable products. In this case, we expect distance to have a large impact, as some developing countries are far from all destination markets and vegetables are a perishable product, although postharvest technology has in recent years allowed for improved conservation during shipping. In this regard, imports of vegetables are negative and statistically significant in our samples of developing countries.

This is relevant as the Organization for Economic Cooperation and Development (OECD) and the Food and Agriculture Organization (FAO) predicting that by the end of the decade, developing countries will experience greater surges in agricultural production, consumption and trade than developed countries (OECD-FAO, 2009). Furthermore, Machine and trunk are another important factor for development countries to import them and they are good tools for economic improvement, in this regard both are statistically significant, but machinery is negatively related to the economic situation in the developing countries. Meaning that, it is not a good factor to promote economic development.

Table 3: Two Step difference SGMM

Variables	Coefficient	Standard Error	T-Value	Interval
CONSTANT	13.58517	.7685876	17.68*** 0.000	15.09157
Distance	.085435	.0798819	1.07 0.285	.2420007
Vegetables	-.033687	.0139508	-2.40*** 0.016	-.006144
Machinery	-.0735088	.0155285	-4.73*** 0.000	-.0430736
Trunks	.0264443	.0099809	2.65*** 0.008	.0460065
Tobacco	.0037846	.016465	0.23 0.818	.0360554
GDPC	-.3627207	.033125	-10.95*** 0.000	-.2977969
Ln Sargent Test	33.91222 0.0012			
AR(1)	-5.7013 0.0000			
AR(2)	1.5688 0.1167			
N	544			
T	15			
Obs per Group	14			
N.Group	34			

Note: All variables are in log form. The equations are estimated with the multilateral trade resistance variables. *, ** and *** denote significance levels at 10%, 5% and 1% respectively.

Finally the estimation in table 4 suggests that the economic mass of the trading partners does not significantly contribute to improvement in imports of machine at the extensive margin. However, the developing countries standards have a significant negative impact on machinery such that for every additional standard requirement imports decline by about 1.96%. This confirms the findings of Chevassus-Lozza et al. (2008) and Van Tongeren et al. (2010). Moreover, Distance variable does not significantly inhibit the extensive margin for machine. The results further indicate that higher prices significantly affect exports at this margin of trade. This means that high costs of compliance often lead to higher prices, which in turn adversely affects exports. In addition only machinery and GDPC are negative and significant, meaning that importing any kind of machine into the developing countries do not lead and effect on economic seriously. In addition, the rest of other variables are not statistically significant. The estimation shows that machinery standards have a significant direct relationship with exports from industrial countries, so that prospective exporters are not discouraged even in the presence of standard requirements. An evaluation of the developing countries directives on machinery, vegetables, tobacco and trunk standards indicate that there has not been relative stability and consistency in the directives, which gives exporters at this margin of trade leverage in exporting. Income in exporting countries does significantly propel exports of these commodities. This could be a result of government and the organic production requirements in this market, which developing countries are not yet struggling to comply with.

Table 4: Two-step difference GMM with robust (SE)

Variables	Coefficient	Standard Error	T-Value	Interval
CONSTANT	13.58517	1.986579	6.84*** 0.000	17.47879
Distance	.085435	.1808936	0.47 0.637	.43998
Vegetables	-.033487	.0340674	-0.98* 0.326	.0332838
Machinery	-.0735088	.0374265	-1.96*** 0.050	-.0001542
Trunks	.0264443	.034832	0.76 0.448	.0947138
Tobacco	.0037846	.0397967	0.10 0.924	.0817846
GDPC	-.3627207	.0763941	-4.75*** 0.000	-.2129909
Ln Sargent Test	33.91222			
	0.0012			
AR(1)	-5.7013			
	0.0000			
AR(2)	1.5688			
	0.1167			
N	476			
T	15			
Obs per Group	14			
N.Group	36			
N.Instruments	21			

Note: All variables are in log form. The equations are estimated with the multilateral trade resistance variables. *, ** and *** denote significance levels at 10%, 5% and 1% respectively.

Conclusions

In many countries non-tariff measures, such as SPS and TBT regulations and standards are becoming increasingly stringent in an attempt to address food safety issues that threaten public health and environment of the planet. However, these new regulations and standards can have detrimental effects on the exports of both developed and some developing countries. This paper employed a gravity model approach to analyze

the impact that stricter regulations and standards, as perceived by importers, had on vegetables, tobacco, trunk, and machine from several developed and developing countries. For our estimation we have applied SGMM model, in the first step and second step in SGMM we have used the same variables, but we have found a different results in our estimation, for example in the first step of SGMM, only 2 variables are significant, while in the second step the significant of variables are increased into 4 variables, this is meaning that the technique is crucial in our estimation. In addition, the evidence shows stricter regulations have a negative overall effect on trade and further suggests that the effect is larger if a developing country imposes the standard. Furthermore, SPS and TBT regulations have detrimental effects on trade, and GDPC has a negative impact on trade, it is supporting the hypothesis in the literature that standards are a not promote trade. The results reveal that importers perceive differences in stringency across countries and stringency has increased in recent years, but not equally across countries or types of standards. Thus, the trend toward increased stringency in sanitary and phytosanitary and TBT standards will affect global agricultural and industrial trade, and the effects will differ depending on which markets and standards become more stringent.

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Appendix

List of the countries in our estimation

<i>Countries Group</i>		<i>Members</i>
<i>Importers (Developing countries)</i>		<i>Algeria, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Bolivia, Brazil, Brunei, Cambodia, Chad, Chile, China, Colombia, Congo, Egypt, Fiji, Georgia, Ghana, Haiti, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz, Lebanon, Mexico, Morocco, Oman, Qatar, Saudi Arabia.</i>
<i>Exporters and developed countries)</i>	<i>(Developing and developed</i>	<i>USA, Japan, Australia, South Korea, China, Malaysia.</i>